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Assistant Commissioner for Patents
Washington, DC 20231

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- ☒ (A) referred to in United States Patent Number 4812823 column _____
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LOCKED TRANSMITTER TAG ASSEMBLY AND METHOD OF LOCKABLY ATTACHING SAME TO OBJECT

BACKGROUND OF THE INVENTION

The present invention relates to means and methods for lockably closing and securing a sealed tag to a desired object. More particularly, the invention relates to a sealed, locked, portable tag assembly wherein electronic circuitry, such as transmitter circuitry used in a monitoring system, can be secured to a desired object and protected from harmful environments.

In U.S. patent application Ser. No. 852,831, filed 04/15/86, which application is assigned to the same Assignee as is the present application, there is disclosed a tag for use with a personnel monitoring system. As indicated therein, a preferred application for such a tag is for use in a house arrest monitoring system wherein individuals who wear the tag can be monitored for compliance with orders or instructions to remain at or report to a prescribed location. As further described in that application, the tag includes electronic circuitry that periodically transmits a unique identifying signal to a remote receiver, which circuitry also includes anti-tamper features for signaling any attempt to remove or otherwise interfere with the proper operation of the tag. U.S. patent application Ser. No. 852,831 is incorporated herein by reference in its entirety.

An important feature of a portable tag used in a personnel monitoring system, as indicated in the referenced application, is that the tag be a self-contained unit that is light-weight, tamper resistant, and can be worn on a limb of the individual being monitored in an unobtrusive manner. Further, the tag must be completely sealed in order to protect the electronic circuits contained therein from exposure to damaging environments. Also, the tag must be made from a substance that is impervious to water and other fluids to which the tag might regularly come in contact, and it should be made from a substance that is comfortable and safe to place against the skin of its wearer.

As described in the above-referenced application, and as shown in FIG. 2 thereof, the tag case is essentially a two-piece molded structure inside of which the electronic circuits and batteries are placed. Once the electronic circuits and batteries are placed inside of the unit, the two pieces of the case are permanently bonded or glued to each other, thereby creating a unitary construction. Such a construction, while offering some advantages, also presents some disadvantages. For example, a unitary construction of this type makes it effectively impossible to service the unit should it malfunction or should the batteries need replacing. Essentially, the case of the unit becomes a throw-away item once the device stops working (either because of malfunction or because of end of battery life), because the case must be literally cut open in order to service the electronic circuits or to replace the batteries.

Further, unless special turn-on circuitry is employed within the electronic circuitry of the tag (which special turn-on circuitry is described in the referenced application), the battery begins to power the electronic circuits from the moment of manufacture when all of the components are sealed into the unitary construction. This is so, even if the tag might be stored on a shelf for many weeks or months before it is actually used, thereby decreasing the effective life of the tag unit. And while

special turn-on circuits can be employed, as described in the cited application, such special circuits may add to the complexity and expense of the unit, although in some instances such complexity and expense is justified for other purposes, such as setting up and testing certain tamper conditions after power up.

Additionally, a unitary construction disadvantageously may require the use of separate fastening means, as suggested in FIGS. 2 and 3A of the cited application, in order to fasten the strap ends together at the required length for firmly holding the tag against the flesh of its wearer. Such fastening means not only represent an additional component that increases the cost of the device, but also represent a discontinuity in the strap as it is placed against the skin, and can thereby noticeably interfere with the comfort of wearing the tag. Moreover, such fastening means has one or more exposed screw heads, and the fastening operation must typically take place with the strap and tag in place against body flesh, making the installation quite cumbersome and uncomfortable to the wearer. Further, as also shown in FIG. 2 of the cited application, connecting ears or lobes protruding out from the tag case are used to connect the strap to the tag housing. These ears or lobes may also decrease the comfort of wearing the tag.

In view of the above, it is evident that what is needed is an improved tag assembly that is easier and less expensive to manufacture, service, and install; more efficient to operate; more tamper resistant; and more comfortable to wear. It would also be desirable to provide a tag wherein the battery and strap can be readily replaced in the field without having to replace the entire unit. The present invention addresses these and other needs.

SUMMARY OF THE INVENTION

The present invention provides a tag assembly that is easier and less costly to manufacture, install, and service than has heretofore been available. The tag assembly provided by the present invention is more comfortable to wear, and more difficult to remove than prior tag assemblies.

The present invention includes a transmitter assembly, a battery pack assembly, a strap, and means for lockably securing the strap and battery pack assembly to the transmitter assembly. The transmitter assembly includes a first sealed compartment wherein electronic circuitry is housed. This circuitry transmits signals that uniquely identify the tag and that signal the occurrence of a sensed tamper event. The transmitter assembly also includes a second compartment, open to a top side of the assembly, into which the battery pack assembly may be sealably inserted. Electrical conductors, built into the transmitter assembly and battery pack assembly, allow electrical contact to be made between the batteries within the battery pack assembly inserted into the second compartment and the electrical circuits housed within the first compartment. Advantageously, should the batteries ever need to be replaced, the battery pack assembly can be removed with the use of cutting tool that cuts one of the locking wedges, described below, and a new battery pack assembly can be sealably inserted into the second compartment of the transmitter assembly.

The means for lockably securing the strap to the transmitter assembly include rails selectively attached